Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application. Claims 1, 8-9, 12-15, 26-27, 29, 36, 39-41, and 50-51 have been amended. Claims 11, 16-23, 38, and 42-48 have been cancelled without prejudice.

Listing of Claims:

Claim 1 (currently amended): A hearing-aid system for processing an acoustic input signal and providing at least one output acoustic signal to a user of the hearing-aid system, the hearing-aid system comprising a first channel and a second channel, wherein one of the channels includes an adaptive delay and the first channel includes:

a) a first directional unit for receiving the acoustic input signal and providing a first directional signal;

b) a first correlative unit coupled to the first directional unit for receiving the first directional signal and providing a first noise reduced signal by utilizing correlative measures for identifying a speech signal of interest in the first directional signal; and,

c) a first compensator coupled to the first correlative unit for receiving the first noise reduced signal and providing a first compensated signal for compensating for a hearing loss of the user, the first compensator including:

i) a normal hearing model unit for receiving an input signal and generating a normal hearing signal;

ii) a neuro-compensator unit for receiving the input signal and providing a pre-processed signal by applying a set of weights to the input signal;

iii) a damaged hearing model unit connected to the neuro-compensator unit for receiving the pre-processed signal and providing an impaired hearing signal; and,

iv) a comparison unit connected to the normal hearing model unit and the damaged hearing model unit for generating an error signal based on a comparison of the normal hearing signal and the impaired hearing signal;

wherein, the error signal is provided to the neuro-compensator unit for adjusting the set of weights such that the normal hearing signal and the impaired hearing signal are substantially similar.

Claim 2 (original): The hearing-aid system of claim 1, wherein the second channel includes:

d) a second directional unit for receiving the acoustic input signal and providing a second directional signal;

e) a second correlative unit coupled to the second directional unit for receiving the second directional signal and providing a second noise reduced signal by utilizing correlative measures for identifying a speech signal of interest in the second directional signal; and,

f) a second compensator coupled to the second correlative unit for receiving the second noise reduced signal and providing a second compensated signal for compensating for a hearing loss of the user.

Claim 3 (original): The hearing-aid system of claim 2, wherein the adaptive delay provides an appropriate delay to one of the first compensated signal and the second compensated signal for matching processing delay in the first and second channels.

Claim 4 (original): The hearing-aid system of claim 1, wherein the correlative measures are provided by atomic decomposition phonemic processing.

Claim 5 (original): The hearing-aid system of claim 4, wherein the atomic decomposition phonemic processing comprises mapping a portion of the first directional signal into a five-dimensional space which comprises dimensions of: duration in time, duration in frequency, temporal centers of gravity, spectral centers of gravity, and change of spectral centers of gravity.

Claim 6 (original): The hearing-aid system of claim 5, wherein the mapping is performed according to: $h_{T_c,F_c,\sigma_T\sigma_F,\beta}(t,f) = \frac{1}{2\pi\sigma_T^2\sigma_F^2} e^{-\left[\frac{1}{2(1-\beta^2)}\left(\frac{(t-T_c)^2}{\sigma_T^2} - \frac{2\beta(t-T_c)(f-F_c)}{\sigma_T\sigma_F} + \frac{(f-F_c)^2}{\sigma_F^2}\right)\right]}$.

Claim 7 (original): The hearing-aid system of claim 4, wherein the atomic decomposition phonemic processing comprises correlating an atom with a portion of the first directional signal according to: $\gamma_p = \arg\max_{\gamma} \left| \left\langle s_{p-1}(t), f\left(\sigma_T, \sigma_F\right) h_\gamma(t) \right\rangle \right|^2$.

Claim 8 (currently amended): The hearing-aid system of claim 1, wherein the correlative measures are provided by acoustic correlative tracking and the first correlative unit comprises:

d) a correlator generator for receiving [[an]] <u>a second </u>input signal and generating a plurality of speech and ~~environment~~ <u>environmental</u> correlates;

e) a control unit coupled to the correlator generator for receiving the speech correlates and the ~~environment~~ <u>environmental</u> correlates and generating a control signal; and,

f) a processing unit coupled to the correlator generator and the control unit, the processing unit receiving the <u>second </u>input signal, the speech correlates and the control signal and processing the speech correlates according to the control signal for extracting speech from the <u>second </u>input signal.

Claim 9 (currently amended): The hearing-aid system of claim 8, wherein the processing unit processes the <u>second </u>input signal by selecting appropriate speech correlates based on the environmental correlates and tracking the appropriate speech correlates.

Claim 10 (original): The hearing-aid system of claim 9, wherein the processing unit employs one of a Kalman filter and a particle filter for tracking the appropriate speech correlates.

Claim 11 (cancelled)

Claim 12 (currently amended): The hearing-aid system of claim [[11]] 1, wherein the neuro-compensator is a neural network.

Claim 13 (currently amended): The hearing-aid system of claim 12, wherein the neuro-compensator applies a set of gain coefficients to the input signal, each gain coefficient being defined for a particular frequency band i according to $\cancel{G_i = \frac{v_i f_i^2}{\sum_j w_j f_j^2 + \sigma}}$

$G_i = \frac{v_i f_i^2}{\sum_j w_{ij} f_j^2 + \sigma}$ where f_i^2 is energy at frequency band i, [[w_j]] w_{ij} is a weight at frequency band [[j]] i and σ is a constant related to the energy f_i^2.

Claim 14 (currently amended): The hearing-aid system of claim 12, wherein a weight [[W_j]] W_i from the set of weights is defined for a particular time-slice at the i^{th} frequency band according to $W_i = \frac{v_i}{\left(\sum_{j=1}^{20} w_{ij} f_j\right)^{1/4} + \left[\sum_{k=0}^{4}\left(z_{ik}\sum_{j=1}^{20} f_j^{n-k}\right)^{1/4}\right] + \sigma}$ where f_j is the magnitude of the input signal in the j^{th} frequency band, v_i is optimized average gain, [[w_{ii}]] w_{ij} is optimized band to band inhibition, z_{ik} is optimized total power inhibition for past times and σ is a constant.

Claim 15 (currently amended): The hearing-aid system of claim [[11]] 1, wherein the error signal is defined according to a Neural Articulation Index (NAI) of the form $NAI = \sum_{i=1}^{N} \alpha_i \cdot ND_i$ where N is a number of frequency bands, α_i is a weight for frequency band i, and ND (Neural Distortion) is defined by $ND = 1 - \frac{Test \cdot Control'}{Control \cdot Control'}$ where Test is a vector of instantaneous spiking rates provided by the damaged hearing model unit and

Control is a vector of instantaneous spiking rates provided by the normal hearing model unit.

Claim 16 (cancelled)

Claim 17 (cancelled)

Claim 18 (cancelled)

Claim 19 (cancelled)

Claim 20 (cancelled)

Claim 21 (cancelled)

Claim 22 (cancelled)

Claim 23 (cancelled)

Claim 24 (original): A compensator for compensating for hearing loss in a hearing-aid, the compensator comprising:

a) a normal hearing model unit for receiving an input signal and generating a normal hearing signal;

b) a neuro-compensator unit for receiving the input signal and providing a pre-processed signal by applying a set of weights to the input signal;

c) a damaged hearing model unit connected to the neuro-compensator unit for receiving the pre-processed signal and providing an impaired hearing signal; and,

d) a comparison unit connected to the normal hearing model unit and the damaged hearing model unit for generating an error signal based on a comparison of the normal hearing signal and the impaired hearing signal;

wherein, the error signal is provided to the neuro-compensator unit for adjusting the set of weights such that the normal hearing signal and the impaired hearing signal are substantially similar.

Claim 25 (original): The compensator of claim 24, wherein the neuro-compensator is a neural network.

Claim 26 (currently amended): The compensator of claim 25, wherein the neuro-compensator applies a set of gain coefficients to the input signal, each gain coefficient being defined for a particular frequency band i according to $\cancel{G_i = \frac{v_i f_i^2}{\sum_j w_j f_j^2 + \sigma}}$

$G_i = \frac{v_i f_i^2}{\sum_j w_{ij} f_j^2 + \sigma}$ where f_i^2 is energy at frequency band i, [[w_j]] w_{ij} is a weight at frequency band [[j]] i and σ is a constant related to the energy f_i^2.

Claim 27 (currently amended): The compensator of claim 25, wherein a weight [[W_j]] W_i from the set of weights is defined for a particular time-slice at the i^{th} frequency according to $W_i = \frac{v_i}{\left(\sum_{j=1}^{20} w_{ij} f_j\right)^{1/4} + \left[\sum_{k=0}^{4}\left(z_{ik}\sum_{j=1}^{20} f_j^{n-k}\right)^{1/4}\right] + \sigma}$ where f_j is the magnitude of the input signal in the j^{th} frequency band, v_i is optimized average gain, [[w_{ii}]] w_{ij} is optimized band to band inhibition, z_{ik} is optimized total power inhibition for past times and σ is a constant.

Claim 28 (original): The compensator of claim 24, wherein the error signal is defined according to a Neural Articulation Index (NAI) of the form $NAI = \sum_{i=1}^{N} \alpha_i \cdot ND_i$ where N is a number of frequency bands, α_i is a weight for frequency band i, and ND (Neural Distortion) is defined by $ND = 1 - \frac{Test \cdot Control'}{Control \cdot Control'}$ where Test is a vector of instantaneous

spiking rates provided by the damaged hearing model unit and Control is a vector of instantaneous spiking rates provided by the normal hearing model unit.

Claim 29 (currently amended): A method of processing an acoustic input signal and providing at least one output acoustic signal to a user of a hearing-aid system, the method comprising providing a first channel and a second channel, wherein one of the channels includes an adaptive delay, and for the first channel, the method comprises:

a) providing directional processing to the acoustic input signal for generating a first directional signal;

b) processing the first directional signal for providing a first noise reduced signal by utilizing correlative measures for identifying a speech signal of interest in the first directional signal; and,

c) processing the first noise reduced signal for providing a first compensated signal for compensating for a hearing loss of the user by:

i) receiving an input signal and generating a normal hearing signal based on a normal hearing model;

ii) receiving the input signal and providing a pre-processed signal by applying a set of weights to the input signal;

iii) receiving the pre-processed signal and providing an impaired hearing signal based on an impaired hearing model; and,

iv) generating an error signal based on a comparison of the normal hearing signal and the impaired hearing signal;

wherein, the error signal is used to adjust the set of weights such that the normal hearing signal and the impaired hearing signal are substantially similar.

Claim 30 (original): The method of claim 29, wherein for the second channel the method includes:

d) providing directional processing to the acoustic input signal for generating a second directional signal;

e) processing the second directional signal for providing a second noise reduced signal by utilizing correlative measures for identifying a speech signal of interest in the second directional signal; and,

f) processing the second noise reduced signal for providing a second compensated signal for compensating for a hearing loss of the user.

Claim 31 (original): The method of claim 30, wherein the method further comprises providing an appropriate delay to one of the first compensated signal and the second compensated signal for matching processing delay in the first and second channels.

Claim 32 (original): The method of claim 29, wherein the method further comprises utilizing atomic decomposition phonemic processing for generating the correlative measures.

Claim 33 (original): The method of claim 32, wherein the atomic decomposition phonemic processing comprises mapping a portion of the first directional signal into a five-dimensional space which comprises dimensions of: duration in time, duration in frequency, temporal centers of gravity, spectral centers of gravity, and change of spectral centers of gravity.

Claim 34 (original): The method of claim 33, wherein the mapping is performed according to: $h_{T_c,F_c,\sigma_T,\sigma_F,\beta}(t,f) = \dfrac{1}{2\pi\sigma_T^2\sigma_F^2} e^{-\left[\frac{1}{2(1-\beta^2)}\left(\frac{(t-T_c)^2}{\sigma_T^2} - \frac{2\beta(t-T_c)(f-F_c)}{\sigma_T\sigma_F} + \frac{(f-F_c)^2}{\sigma_F^2}\right)\right]}$.

Claim 35 (original): The method of claim 32, wherein the atomic decomposition phonemic processing comprises correlating an atom with a portion of the first directional signal according to: $\gamma_p = \arg\max_{\gamma} \left|\left\langle s_{p-1}(t), f\left(\sigma_T,\sigma_F\right) h_\gamma(t)\right\rangle\right|^2$.

Claim 36 (currently amended): The method of claim 29, wherein the method further comprises providing acoustic correlative tracking for generating the correlative measures, wherein the acoustic correlative tracking comprises:

d) receiving [[an]] a second input signal and generating a plurality of speech and ~~environment~~ environmental correlates;

e) receiving the speech correlates and the ~~environment~~ environmental correlates and generating a control signal; and,

f) processing the speech correlates according to the control signal for extracting speech from the second input signal.

Claim 37 (original): The method of claim 36, wherein processing the speech correlates includes selecting appropriate speech correlates based on the environmental correlates and tracking the appropriate speech correlates.

Claim 38 (cancelled)

Claim 39 (currently amended): The method of claim [[38]] 29, wherein applying the set of weights results in applying a set of gain coefficients to the input signal, each gain coefficient being defined for a particular frequency band i according to $\cancel{G_i = \frac{v_i f_i^2}{\sum_j w_j f_j^2 + \sigma}}$

$G_i = \frac{v_i f_i^2}{\sum_j w_{ij} f_j^2 + \sigma}$ where f_i^2 is energy at frequency band i, [[w_j]] w_{ij} is a weight at frequency band [[j]] i and σ is a constant related to the energy f_i^2.

Claim 40 (currently amended): The method of claim [[38]]29, wherein a weight [[W_j]] W_i from the set of weights is defined for a particular time-slice at the i^{th} frequency band according to $W_i = \frac{v_i}{\left(\sum_{j=1}^{20} w_{ij} f_j\right)^{1/4} + \left[\sum_{k=0}^{4}\left(z_{ik}\sum_{j=1}^{20} f_j^{n-k}\right)^{1/4}\right] + \sigma}$ where f_j is the magnitude of the input

signal in the j^{th} frequency band, v_i is optimized average gain, [[w_{ii}]] $\underline{w_{ij}}$ is optimized band to band inhibition, z_{ik} is optimized total power inhibition for past times and σ is a constant.

Claim 41 (currently amended): The method of claim [[38]] 29, wherein the error signal is defined according to a Neural Articulation Index (NAI) of the form $NAI = \sum_{i=1}^{N} \alpha_i \cdot ND_i$ where N is a number of frequency bands[[.]], α_i is a weight for frequency band i, and ND (Neural Distortion) is defined by $ND = 1 - \frac{Test \cdot Control'}{Control \cdot Control'}$ where Test is a vector of instantaneous spiking rates generated by the damaged hearing model and Control is a vector of instantaneous spiking rates provided by the normal hearing model.

Claim 42 (cancelled)

Claim 43 (cancelled)

Claim 44 (cancelled)

Claim 45 (cancelled)

Claim 46 (cancelled)

Claim 47 (cancelled)

Claim 48 (cancelled)

Claim 49 (original): A method of compensating for hearing loss in a hearing-aid, the method comprising:

a) receiving an input signal and generating a normal hearing signal based on a normal hearing model;

b) receiving the input signal and providing a pre-processed signal by applying a set of weights to the input signal;

c) receiving the pre-processed signal and providing an impaired hearing signal based on an impaired hearing model; and,

d) generating an error signal based on a comparison of the normal hearing signal and the impaired hearing signal;

wherein, the error signal is used to adjust the set of weights such that the normal hearing signal and the impaired hearing signal are substantially similar.

Claim 50 (currently amended): The method of claim 49, wherein applying the set of weights results in applying a set of gain coefficients to the input signal, each gain coefficient being defined for a particular frequency band i according to ~~$G_i = \frac{v_i f_i^2}{\sum_j w_j f_j^2 + \sigma}$~~

$\underline{G_i = \frac{v_i f_i^2}{\sum_j w_{ij} f_j^2 + \sigma}}$ where f_i^2 is energy at frequency band i, [[w_j]] $\underline{w_{ij}}$ is a weight at frequency band [[j]] $\underline{i}$ and σ is a constant related to the energy f_i^2.

Claim 51 (currently amended): The method of claim 49, wherein a weight [[W_j]] $\underline{W_i}$ from the set of weights is defined for a particular time-slice at the i^{th} frequency band according to $W_i = \frac{v_i}{\left(\sum_{j=1}^{20} w_{ij} f_j\right)^{1/4} + \left[\sum_{k=0}^{4}\left(z_{ik}\sum_{j=1}^{20} f_j^{n-k}\right)^{1/4}\right] + \sigma}$ where f_j is the magnitude of the input signal in the j^{th} frequency band, v_i is optimized average gain, [[w_{ii}]] $\underline{w_{ij}}$ is optimized band to band inhibition, z_{ik} is optimized total power inhibition for past times and σ is a constant.

Claim 52 (original): The method of claim 49, wherein the error signal is defined according to a Neural Articulation Index (NAI) of the form $NAI = \sum_{i=1}^{N} \alpha_i \cdot ND_i$ where N is a

number of frequency bands, α_i is a weight for frequency band i, and ND (Neural Distortion) is defined by $ND = 1 - \frac{Test \cdot Control'}{Control \cdot Control'}$ where Test is a vector of instantaneous spiking rates provided by the damaged hearing model and Control is a vector of instantaneous spiking rates provided by the normal hearing model.